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THE SCORE-CARD SYSTEM OF
DAIRY INSPECTION.

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THE SCORE-CARD SYSTEM OF DAIRY INSPECTION.

INTRODUCTION.

Modern investigations in dairy sanitation have shown the importance of producing and handling milk under clean conditions. An important factor in attaining that result is the score-card system of dairy inspection, which deals with itemized conditions in the dairy arranged in logical order, each of which is given a definite mathematical rating, the total number of points for a perfect dairy amounting to 100. (See p. 6.)

The system is not new. So far as the writers have been able to determine, it was first introduced and used by Dr. William C. Woodward, health officer of the District of Columbia, January 9, 1904. Following this, a somewhat different form of score card was presented by Prof. R. A. Pearson (now New York State Commissioner of Agriculture), at a field meeting in Syracuse, February 25, 1905. Both of these cards had many good features and had they been generally adopted they would have done much to improve dairy conditions.

For the past two years the Bureau of Animal Industry, through the Dairy Division, has been making a thorough investigation of the milk supply of a number of cities in different sections of the country for the purpose of establishing a system of inspection that would be practical and comprehensive and meet the demands of those who have to do with the control of the milk supply. The Dairy Division, believing the score-card system to be a practical one for the improvement of the milk supply, took up its use with the hope of extending it and securing more thorough inspection. A somewhat modified form of score card was prepared July 1, 1906, having in view its general adaptability to all sections of the country. This has been introduced and adopted in a number of cities and has been used by Dairy Division inspectors for the past two years where the division has been called upon to give assistance to health officers and inspectors in improving and controlling the supply of market milk. Some changes have been made in the card from time to time as practical experience showed where it could be improved. About 2,000 dairies have been scored by the division in all sections of the country during the past two years, and boards of health in the cities referred to have rated over 10,000 others by this system within the past year.

During the fiscal year ended June 30, 1908, the Dairy Division score card, or a slight modification of it, was adopted or used by city or State officials, creameries, dealers, etc., in 61 cities, while 79 other cities were given assistance through correspondence or visits, making a total of 140 cities that were given more or less assistance during the year. These cities are shown in the following list, those adopting the score-card system being marked with an asterisk.

California:

Hollister.
 *Los Angeles.
 Oakland.
 Pasadena.
 *Redlands.
 *Riverside.
 Sacramento.
 Salinas.
 San Bernardino.
 San Diego.
 *San Francisco.
 San Jose.
 Santa Barbara.
 Santa Cruz.
 Stockton.
 Vallejo.

Colorado:

*Boulder.
 *Colorado Springs.
 *Denver.
 *Fort Collins.
 Greeley.

Connecticut:

*Hartford.
 Orange.
 Stamford.

District of Columbia:

*Washington.

Georgia:

*Atlanta.
 Savannah.
 Waycross.

Illinois:

*Chicago.
 Harvard.
 Normal.
 Waukegan.

Indiana:

Clinton.
 *Fort Wayne.
 *Indianapolis.
 *Muncie.
 Richmond.

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Iowa:

Des Moines.
 Sheldon.

Kansas:

*Coffeyville.
 Fort Scott.
 *Hutchinson.
 Independence.
 Iola.
 *Manhattan (State
 dairy commis-
 sioner).
 *Parsons.
 *Topeka.
 *Wichita.

Kentucky:

Covington.
 Lexington.
 *Louisville.

Maine:

*Auburn (creamery).
 *Augusta (State dairy
 inspector).
 *Brunswick.
 *Pittsfield (creamery).
 *Portland.
 *Skowhegan (creamery).
 Winthrop (creamery).

Maryland:

*College Park (experi-
 ment station).

Massachusetts:

*Amherst (State col-
 lege).
 *Brockton.
 *Cambridge.
 *Charlestown.
 Chelmsford.
 *Fall River.
 Haverhill.
 Salem.
 *Springfield.
 Southbridge.
 Worcester.

Michigan:

Grand Rapids.
 Jackson.

Minnesota:

*Minneapolis.
 St. Paul.

Missouri:

*Carthage.
 Greenwood.
 Hannibal.
 Jefferson City.
 *Joplin.
 Kansas City.
 *St. Louis.
 Sedalia.

Nebraska:

Omaha.
 South Omaha.

Nevada:

Reno.

New Hampshire:

*Concord.

New Jersey:

*Montclair.
 *New Brunswick.
 *Trenton.

New York:

Auburn.
 *Canton (State school
 of agriculture).
 Clinton.
 *Cortland.
 *Glens Falls.
 Little York.
 Lockport.
 *New Paltz.
 Olean.
 *Rochester (dairy com-
 pany).
 Southampton.
 *Syracuse.
 *Yonkers.

North Carolina:	Oregon:	Utah:
*Asheville.	Portland.	*Salt Lake City.
Charlotte.	Pennsylvania:	Virginia:
Ohio:	Greenville.	Manchester.
Akron.	*Pittsburg.	*Norfolk.
Chillicothe.	Rhode Island:	*Portsmouth.
Cincinnati.	*Providence.	*Richmond.
*Cleveland.	South Carolina:	Roanoke.
*Hamilton.	Charleston.	Washington:
Middletown.	Columbia.	Bellingham.
Oberlin.	Tennessee:	*Everett.
*Sandusky.	*Memphis.	North Yakima.
*Springfield.	Nashville.	*Seattle.
Oklahoma:	Texas:	*Spokane.
Muskogee.	Dallas.	*Tacoma.
*Oklahoma.	Galveston.	Wisconsin:
Tulsa.		Milwaukee.

EFFORTS TO SECURE UNIFORMITY IN THE SYSTEM.

At the first meeting of the Official Dairy Instructors' Association, held at the State University, Urbana, Ill., July 17, 1906, a score-card committee was appointed to prepare a card which would best meet the needs of dairy inspectors, with a view to its uniform adoption throughout the country. This committee consisted of C. B. Lane, assistant chief of the Dairy Division; R. A. Pearson, State dairy commissioner, New York; and J. M. Trueman, professor of dairying, Connecticut Agricultural College. The committee prepared a card and submitted it at the second meeting of the association, held at the National Dairy Show, Chicago, October 11, 1907. The association voted to have a supply of the cards printed and distributed for trial among the heads of the various dairy departments of the agricultural colleges, reports of the results to be sent to the committee. At the third meeting of the Official Dairy Instructors' Association, held at Cornell University, July 22, 1908, the committee presented the score card in a new form, embodying as far as possible the criticisms submitted by the heads of the various dairy departments. This card, with a few minor changes, was adopted by the association, the committee still being continued so as to recommend any necessary changes at future meetings. In order, therefore, to promote uniformity in the score-card system wherever used, the Dairy Division has adopted the association card and will use it in future inspection work.

The separation of dairy conditions into equipment and methods is a strong feature of this card. The score for equipment indicates the quality and sufficiency of the tools that the dairyman has to work with, while the score for methods gives an accurate idea of the way the dairyman uses his equipment and indicates whether he is practicing right methods.

For convenience the subject of the score-card system of inspection will be discussed under three heads: First, inspection of dairy farms; second, inspection of city milk plants and methods of distributing milk; third, inspection of the product as delivered to the consumer.

THE INSPECTION OF DAIRY FARMS.

State officials and city boards of health are generally agreed that there should be some kind of inspection of dairy farms and some kind of a standard established which every dairyman should live up to if allowed to sell milk. This being the case, the only question that remains is, What system will be most helpful to the inspector and producer and at the same time accomplish the desired result with the least amount of friction?

The objects of inspection may be stated as follows:

1. To determine in a systematic way the exact conditions in the dairies and record the same in convenient form for reference.
2. To educate the producer to better methods.
3. To protect the public from impure milk.

Two years' experience with the score-card system has given abundant proof of its merits as a means of improving the milk supply of cities; and we feel it should be a valuable aid to those officers who are held responsible for the quality of market milk. The latest form of the card is as follows:

[Front of card.]

[United States Department of Agriculture, Bureau of Animal Industry, Dairy Division.]

SANITARY INSPECTION OF DAIRIES.

DAIRY SCORE CARD.

Adopted by the Official Dairy Instructors' Association.
(Subject to revision at future meetings.)

Owner or lessee of farm: _____.

P. O. address: _____. State: _____.

Total number of cows: _____. Number milking: _____.

Gallons of milk produced daily: _____.

Product retailed by producer in _____.

Sold at wholesale to _____.

For milk supply of _____.

Permit No.: _____. Date of inspection: _____, 190 .

Remarks: _____

(Signed) _____, *Inspector.*

SANITARY INSPECTION OF DAIRIES.

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[Back of card.]

DETAILED SCORE.

EQUIPMENT.	SCORE.		METHODS.	SCORE.	
	Perfect.	Allowed.		Perfect.	Allowed.
COWS.			COWS.		
Health.....	6		Cleanliness of cows.....	8	
Apparently in good health. 1					
If tested with tuberculin			STABLES.		
once a year and no tuber-			Cleanliness of stables.....	6	
culosis is found, or if			Floor..... 2		
tested once in six months			Walls..... 1		
and all reacting animals			Ceiling and ledges..... 1		
removed..... 5			Mangers and partitions... 1		
(If tested only once a year and			Windows..... 1		
reacting animals found and re-			Stable air at milking time.....	6	
moved, 2.)			Barnyard clean and well drained	2	
Comfort.....	2		Removal of manure daily to		
Bedding..... 1			field or proper pit.....	2	
Temperature of stable..... 1			(To 50 feet from stable, 1.)		
Food (clean and wholesome).....	2				
Water.....	2		MILK ROOM.		
Clean and fresh..... 1			Cleanliness of milk room.....	3	
Convenient and abundant. 1					
STABLES.			UTENSILS AND MILKING.		
Location of stable.....	2		Care and cleanliness of utensils..	8	
Well drained..... 1			Thoroughly washed and ster-		
Free from contaminating			ilized in live steam for 30		
surroundings..... 1			minutes..... 5		
Construction of stable.....	4		(Thoroughly washed and		
Tight, sound floor and			placed over steam jet, 4; thor-		
proper gutter..... 2			oughly washed and scalded		
Smooth, tight walls and			with boiling water, 3; thor-		
ceiling..... 1			oughly washed, not scalded, 2.)		
Proper stall, tie, and man-			Inverted in pure air..... 3		
ger..... 1			Cleanliness of milking.....	9	
Light: Four sq. ft. of glass per			Clean, dry hands..... 3		
cow.....	4		Udders washed and dried. 6		
(Three sq. ft., 3; 2 sq. ft., 2; 1			(Udders cleaned with moist		
sq. ft., 1. Deduct for uneven			cloth, 4; cleaned with dry cloth		
distribution.)			at least 15 minutes before milk-		
Ventilation: Automatic system..	3		ing, 1.)		
(Adjustable windows, 1.)			HANDLING THE MILK.		
Cubic feet of space for cow: 500			Cleanliness of attendants.....	1	
to 1,000 feet.....	3		Milk removed immediately from		
(Less than 500 feet, 2; less than			stable.....	2	
400 feet, 1; less than 300 feet, 0;			Prompt cooling. (Cooled im-		
over 1,000 feet, 0.)			mediately after milking each		
UTENSILS.			cow).....	2	
Construction and condition of			Efficient cooling; below 50° F.....	5	
utensils.....	1		(51° to 55°; 4; 56° to 60°; 2.)		
Water for cleaning.....	1		Storage; below 50° F.....	3	
(Clean, convenient, and abun-			(51° to 55°; 2; 56° to 60°; 1.)		
dant.)			Transportation; iced.....	3	
Small-top milking pail.....	3		(For jacket or wet blanket		
Facilities for hot water or steam..	1		allow 2; dry blanket or covered		
(Should be in milk house, not			wagon, 1.)		
in kitchen.)					
Milk cooler.....	1				
Clean milking suits.....	1				
MILK ROOM.					
Location of milk room.....	2				
Free from contaminating					
surroundings..... 1					
Convenient..... 1					
Construction of milk room.....	2				
Floor, walls, and ceiling.... 1					
Light, ventilation, screens. 1					
Total.....	40		Total.....	60	

Score for equipment+score for methods=final score.

NOTE 1.—If any filthy condition is found, particularly dirty utensils, the total score shall be limited to 49.

NOTE 2.—If the water is exposed to dangerous contamination or there is evidence of the presence of a dangerous disease in animals or attendants, the score shall be 0.

DIRECTIONS FOR USING DAIRY-FARM SCORE CARD.

The card is arranged with separate columns for "Equipment" and "Methods" and allows a total of 40 and 60 points, respectively, for each. This arrangement of points is made for the purpose of emphasizing the importance of good methods and giving unmistakable credit for cleanliness. A person may be handicapped by poor buildings which he has inherited or leased and which he can not afford to rebuild; but he can be clean. Painsstaking methods, particularly in regard to cleanliness, will give a creditable score in spite of poor equipment.

EQUIPMENT.

Health of cows.—Cows should be healthy and in good condition. A dairy cow should not be badly emaciated or have a rough, coarse coat, whether arising from insufficient feed, lack of care, or disease. The herd is scored as a whole; if one animal in the lot has a swollen jaw, inflamed udder, running sore, or ulcerated teat, a proportional deduction should be made from the herd score, unless the inspector is satisfied that the milk from such cow does not enter into the general supply. It may be seen from the card that if the herd is tested with tuberculin once a year and no tuberculosis is found, or if tested once in six months and all reacting animals are removed, the score will be considered perfect and 5 points allowed. If tested only once a year and reacting animals are found and removed, 2 points are allowed.

Comfort of cows.—A cow secretes normal milk only when she is comfortable. Her nervous system may be so disturbed that her milk will be unwholesome, especially for babies. Cows should be bedded so as to promote their comfort, especially where the floor is of concrete. Dusty or moldy hay or horse manure should not be used for bedding. The stable should be so constructed that the cow can be comfortable when the weather is inclement; wide cracks and very high ceilings should reduce the score.

Feed.—Feed should be free from mustiness or decomposition. Decaying silage, fermenting brewers' grains, distillery slops, or moldy or dusty hay should reduce the score.

Water.—Drinking water must be clean and fresh; stagnant pools do not furnish proper drinking water for cows; neither do wells so located as to receive contamination from barnyard, sink drain, or privy. Sometimes the various watering devices are so misused that the water is neither clean nor fresh.

Light.—An abundance of light destroys bacteria and promotes the health of animals. In scoring a stable for light, the number of stanchions rather than the number of cows which happen to be in the barn at the time of inspection should be considered.

Ventilation.—Ventilation means the removal of impure air and the supplying of fresh air, without drafts on the animals, and in

such a way as to conserve as much as possible the animal heat of the cows in cold weather. Consequently a stable with plenty of air space or with numerous openings to the outdoor air may be poorly ventilated. The stable should be scored for its adaptability to secure desired results when those results are needed, and not merely on conditions found at the time of the inspector's visit. A stable with open doors or with wide cracks in the sides should not be given credit for ventilation at any time. Large spaces in lofts or hay holes drawing the warmth away from the cows do not answer the full definition of ventilation, although they may afford pure air. A stable in which the cows have been kept overnight should be comfortably warm in the morning without disagreeable animal odors. Score according to the system of ventilation in use, and see that it works properly. It will be noted on the score card that methods of ventilation that depend on the care and thoughtfulness of an attendant do not rate as high as those which are automatic.

Cubic space.—An overcrowded barn produces discomfort, is hard to keep clean, and usually results in impure air. On the other hand, an excessive amount of space for each animal tends to waste the natural heat from the cows' bodies. A proper amount of space per animal is considered to be from 500 to 1,000 cubic feet. In sections where the winters are cold deductions should be made when the space exceeds the maximum amount. In scoring for cubic feet of air space per cow consider the number of stalls rather than the number of cows which happen to be present at the time of inspection. A stable having 50 stanchions with 15,000 cubic feet of space can properly be regarded as having 300 cubic feet per cow.

Stables.—Stables should be located on well-drained land and be free from contaminating surroundings. Horse stables, pigpens, chicken coops, stagnant water, manure piles, privies, etc., when near enough to pollute the stable air, should reduce the score.

The stable should have a tight, sound floor, incapable of absorbing liquids to any extent. Back of the cows should be a gutter (preferably of concrete) of sufficient capacity to hold the droppings and keep them from soiling the cows. A gutter 14 inches wide and 6 inches deep is recommended. It should have sufficient incline to drain readily unless the liquid manure is taken up by absorbents. Some form of swing stanchion is the best kind of tie, as it allows considerable freedom and keeps the animals out of the gutter. The manger should be as simple as possible. Cumbersome constructions serve to collect dust and prevent circulation of air, and they are difficult to keep clean. A low concrete trough or a smooth floor answers the purpose and is given a perfect score. Walls and ceilings should be smooth and tight.

Utensils.—Utensils should be of tin, with as few seams as possible. Seams which are unavoidable should be flushed smooth with solder.

Rusty and battered tinware should not be used. Wire-gauze strainers should be avoided, also strainers which are complicated or have inaccessible parts, hard to clean. The water supply for washing utensils should be clean, abundant, and convenient, as the chances are against thorough cleansing when the water supply is meager or inconvenient. Impure water may convey undesirable bacteria to the utensils; hence shallow wells receiving drainage of impure water are to be regarded with suspicion. No water from wells where drainage from house wastes or barnyard is possible should come in contact with milk utensils. Small-top milk pails should be used, as they keep out dirt and do much to promote clean milk.

Milking should be done in clean suits used only for that purpose and stored in a clean place when not in use. A milk cooler should be found in every milk room, as well as facilities for an abundance of hot water or steam. A boiler with plenty of steam for scalding all utensils is the perfect arrangement; but an abundance of boiling water which can be used while it is in a boiling condition is a good substitute.

Milk house.—Every dairy should have a milk house or milk room fitted especially for the business, in which milk can be strained, cooled, bottled or canned, and stored, and in which utensils can be washed and cared for. This should be convenient to the barn, as work is usually done best under convenient conditions. The milk house or room should not be near the hogpen, manure piles, privy, or anything that might contaminate the air; if attached to the barn it should have an independent outside entrance; if entered from the barn it should be through a well-ventilated passageway with self-closing doors at each end, only one of which can be open at a time. The milk room should be light, well ventilated, and screened. Flies should never have access to milk. The floor should be smooth and of concrete, sloping so as to give good drainage; the edges should be rounded to prevent angles for collecting and harboring dirt. The walls and ceiling should be smooth and tight; concrete or tile wainscoting is desirable.

METHODS.

Cows.—Cows are reasonably clean when carefully groomed each day and when long hairs on the flanks and udders are clipped. Dust on backs, particles of manure on sides or udders, and long hairs should deduct from score.

Stable.—Stable floors should be kept clean by frequent, careful sweeping and washing. An earth floor is undesirable. Walls should be free from manure. Joists, brackets, braces, tops of stanchions, partitions, ledges, and ceilings should be clean and free from dust and cobwebs. Mangers should be clean and sweet; care should be taken that there is no dirt or fermenting feed in cracks and corners. Whitewash should be freely applied on walls, ceilings, partitions, etc. Windows should be clean.

Air in stable.—The stable air should be free from dust or odors at time of milking. It may be contaminated by horses in the stable, by hogs in the basement, by manure in a cellar, by feeding silage just before milking, or by moving hay or other dusty fodder just before milking. When inspectors can not be present at the time of milking a reasonably accurate estimate of conditions can be reached by general appearances and by questioning the person in attendance as to time and manner of feeding, etc.

Manure.—The manure should be removed daily from the stable to such a distance as to preclude the chance of odors getting back. There should be no manure in the stable yard, which should be kept clean. Where conditions are favorable the ideal way is to remove the manure daily to the field. It should not be thrown into the barnyard.

Utensils.—All utensils should be clean to superficial inspection; no particles of dirt should be found in seams or concealed places; after washing the utensils should be scalded with boiling water or steam to sterilize them. They should then be inverted in pure air to drain. The highest score can be given only where there is an abundance of steam freely used. Boiling water can be used so as to be as effective as steam, but the ordinary equipment for heating water does not provide it in sufficient quantities and of sufficient heat to sterilize the utensils.

Milking.—Methods of milking should be clean. The milker should milk with clean, dry hands. The cows' udders should also be clean; a perfect score is secured only by washing them thoroughly and then wiping dry with a clean towel. Wiping with a moist cloth is the next best thing, and wiping with a clean dry cloth gives one point on the score, if it is done several minutes previous to milking so that the dust can settle before the milking begins. If the milker after sitting down to milk gives the udder a rub with his hands or a dry cloth he may stir up dust that will fall back into the milk pail; such a method is generally worse than none.

It would be desirable to have all scoring done at milking time, but this is impracticable, as it would usually limit the work of the inspector to two or three dairies a day. Careful questioning by the inspector, with close examinations, will usually give him a fairly accurate idea of the method of milking. If, for instance, he is told that the udders are carefully washed daily, while inspection shows small lumps of manure attached to the long hairs near the teats, only one inference is possible.

Handling milk.—Milk as soon as drawn should be immediately removed from the stable so that it may absorb no odors or dust. If for convenience several milkers fill one can in the stable, a perfect score could not be given even if the can is promptly taken to the milk room when full, for it is bad practice to pour milk in the stable; but

the score should be higher under such conditions than if the milk remained in the barn till all the cans were filled. When two cows or more are milked to fill a pail, which is then taken to the milk house, the score would not be quite perfect, but would be much better than where the milk is strained behind the cows.

As soon as the milk reaches the milk room it should be cooled. This is best performed by running it in a thin sheet over a surface kept cool by ice water. Spring water of a temperature under 60° F. has much merit for cooling milk, though not as good as ice. This process is sometimes carelessly called aerating, because aeration is an incident of the cooling; but aerating as such is not in favor with the best authorities. The object of this step in handling milk is to secure prompt and efficient cooling rather than aeration, and the advantages of such cooling more than offset any possible injury from the extra exposure of the milk to the air, even if it is relatively pure. Where milk is sold by the can it is frequently cooled by setting the cans in ice water or in spring water below 60° F. This is better than no cooling, but not as satisfactory as running the milk over a cooler. Sometimes the evening milk is properly cooled, while the morning milk is delivered warm. This practice will give one-half the score for cooling providing the two kinds of milk are not mixed, in which case the score would be zero.

Storing.—This refers to conditions where the night's milk is held over for delivery in the morning. When the producer goes to the trouble and expense of two deliveries a day, that extra delivery can offset the absence of storing facilities and give him a perfect score on this item.

Transportation.—Transportation is to be scored from the same view point as stables, the adaptability of the method being the main point. It would be obviously unfair to cut a score made in midwinter because milk was not iced in transportation when the producer is in the habit of using ice in summer.

ADVANTAGES OF THE SCORE-CARD SYSTEM TO THE HEALTH OFFICER AND TO THE PUBLIC.

The experience of the Dairy Division inspectors and reports from some 60 health officers have supplied a fund of information relative to the use of the score card. Only a brief summary can be given here.

As a system of keeping records.—It gives the health officer a permanent and accurate record of all dairies in a convenient form for the office files and for ready reference in comparing not only different dairies but the same dairy inspected at different times. Score cards 5 by 7 inches are convenient in size both for filing and for use in the field.

As a basis for issuing permits.—A number of cities have set standards of 50 to 60 points which every dairyman must reach before a permit

is issued. This forces the poorer dairies to improve or go out of business, as they are given only a limited time to comply with the demands of the board of health.

Checking the work of inspectors.—The health officer can call for reports and know what his inspectors are doing every day. Further, it is practically impossible for an inspector to fill out a score card without seeing the actual conditions.

Publication of scores.—The score-card system permits of tabulating information as to conditions in the dairies so that they can be clearly shown, and by the publication of scores at intervals every dairyman is given full credit for every effort he has made to produce clean milk.

Perhaps one of the greatest drawbacks to improvement is the fact that milk from good dairies and poor dairies practically all sells for the same price. For example, dairies scoring 40 or 50 points sell their product for the same price as dairies scoring 70 or 80 points and which have incurred considerable expense in improvements. This is manifestly unfair to the producers and unbusinesslike on the part of the health departments. Publication of scores goes a long way toward correcting this state of affairs, by encouraging the better dairymen to continue to improve while calling public attention to those who are careless and slovenly. This indifferent class should be forced to fix up their places or go out of business. They are not entitled to sell milk in competition with their neighbors who are first-class dairymen.

The following illustrates the method of publishing the scores of dairies in one city:

[Extract from report of Montclair (N. J.) board of health, 1906.]

Dairyman. Dealer. ^a	Ratings.					
	Cows.	Stables.	Milk house.	Milking.	Handling of milk.	Total score.
(Perfect score).....	20	25	20	15	20	100
1.....	b 18	21	20	15	20	94
2.....	b 19	22	20	12	19	92
3.....	12	19	20	12	19	82
4.....	10	21	19	13	19	82
5.....	11	19½	18	12	19	79½
6.....	11	19	18	12	18	78
7.....	10	16	20	12	19	77
8.....	11	19	19	12	15	76
9.....	9	20	19	8	19	75
10.....	9	19	17	11	18	74
11.....	11	18	13	12	17	71
12.....	11	11	16	12	18	68
13.....	11	14½	16	9	15½	66
14.....	9	11	15	10	15	60
15.....	11	13	13	10	11	58
16.....	9	19	4	12	14	58
17.....	8	10	4	12	14	48
18.....	10	8	6	9	12	45
19.....	8	10	4	10	12	44
20.....	9	13	4	8	9	43
21.....	6	8	4	9	12	39
22.....	5	2	6	5	15	33

^a Names of dairymen and dealers are given in the report.

^b These cattle are tuberculin tested.

Consumers who take an interest in their milk supply are not slow to note the standing of the dairies, and frequently select one that rates well even though the price of the milk may be a little higher. Naturally this encourages the dairyman who is trying to do things right and discounts the dirty and slovenly dairyman.

As a means of improving dairy conditions.—There is abundant proof that the score-card system brings immediate and permanent results wherever it is put in practice. The following quotations and records will serve to illustrate the possibilities of improvement within a short period. The table below shows the improvement in 20 dairy farms at Richmond, Va., which made the greatest percentage gain from the first score to the last one during a period of six months.

[From report of Richmond board of health, October, 1907, showing improvement in dairies during six months following introduction of score-card system.]

First score.	Last score.	Points gained.	Percentage gain.
20.0	62.5	42.5	212
31.0	70.5	39.5	127
25.5	56.0	30.5	119
27.0	59.0	32.0	117
26.0	50.5	24.5	94
30.0	55.0	25.0	83
31.0	54.5	23.5	76
35.5	61.0	25.5	72
28.5	49.0	20.5	72
26.5	44.5	18.0	68
26.5	43.5	17.0	64
36.5	59.5	23.0	63
35.0	55.5	20.5	59
39.5	61.5	22.0	56
38.5	60.0	21.5	56
41.5	61.0	19.5	47
33.0	47.5	14.5	44
43.5	61.0	17.5	40
45.5	61.0	15.5	34
48.0	64.0	16.0	33
Average..33.4	56.8	23.4	76.8

It will be noted that the average score of the dairies increased from 33.4 to 56.8, or 76.8 per cent, in six months. This furnishes a striking example of the possibilities of improving dairy conditions through the score-card system.

The first of the scores above given was the third lowest on the list at the first scoring, being only 20. This place, says the health officer, was indescribably bad. Seventeen cows were huddled into two small, dark, foul sheds, with about 200 cubic feet of air space to each cow. The water supply was grossly contaminated. The milk was poured from dirty milk pails into cans which stood in manure in a dirty stable yard. Everything was in keeping with this partial picture. This man took immediate steps to meet the requirements. His scores showed steady improvement, visit by visit, the last score showing 62.5, which is considerably above the average.

The report states that in the six months there had been built 67 new milk houses, and 12 more were ordered. Few of the dairies had "aerators" for cooling their milk; now all have them. Eleven new cow barns had been built and 8 were under construction.

Naturally all this was not done without some opposition, but with very few exceptions the most excellent feeling prevails, some who were at first most opposed to the move being now among the best friends of the health department.

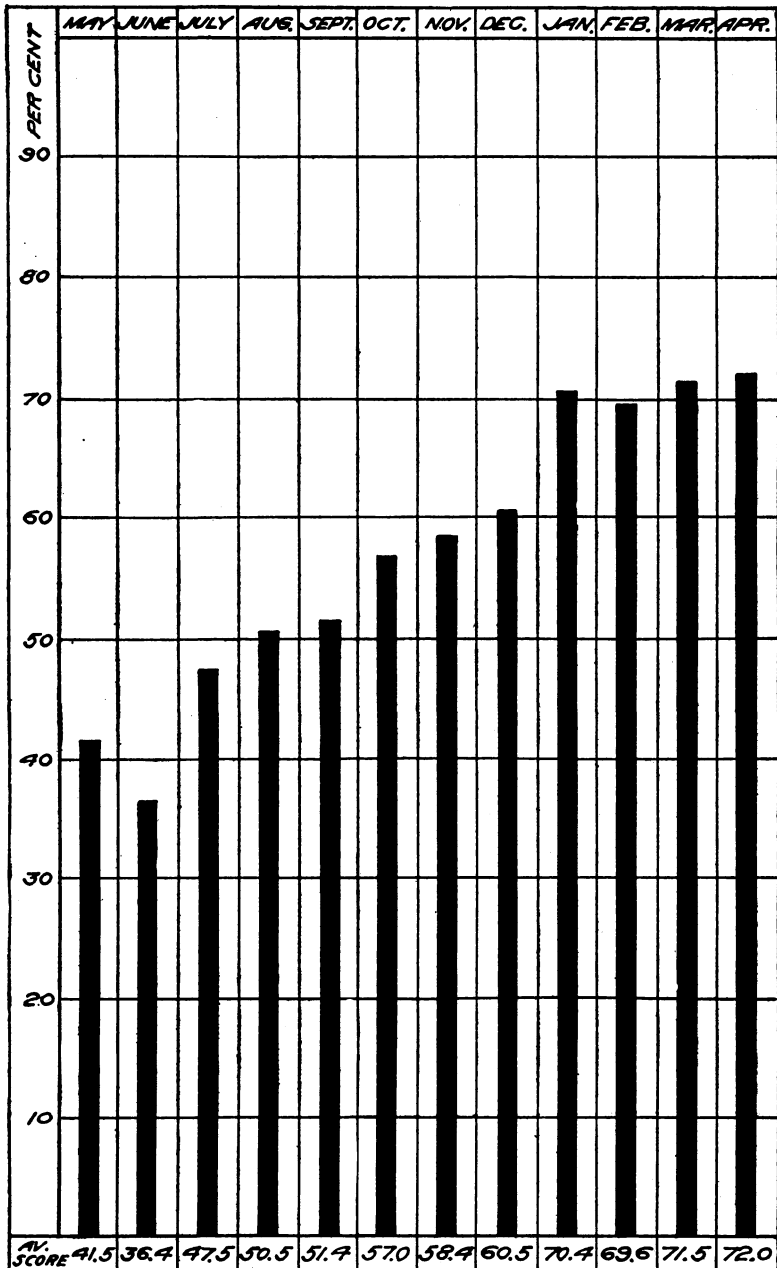


FIG. 1.—Diagram showing monthly increase in average rating of dairies supplying milk to Richmond, Va., during 1907-8. Heavy lines represent average scores of all dairies for each month.

The improvement in the dairies supplying milk to Richmond following the introduction of the score-card system is graphically shown by the accompanying diagrams. It will be noted from figure 1 that

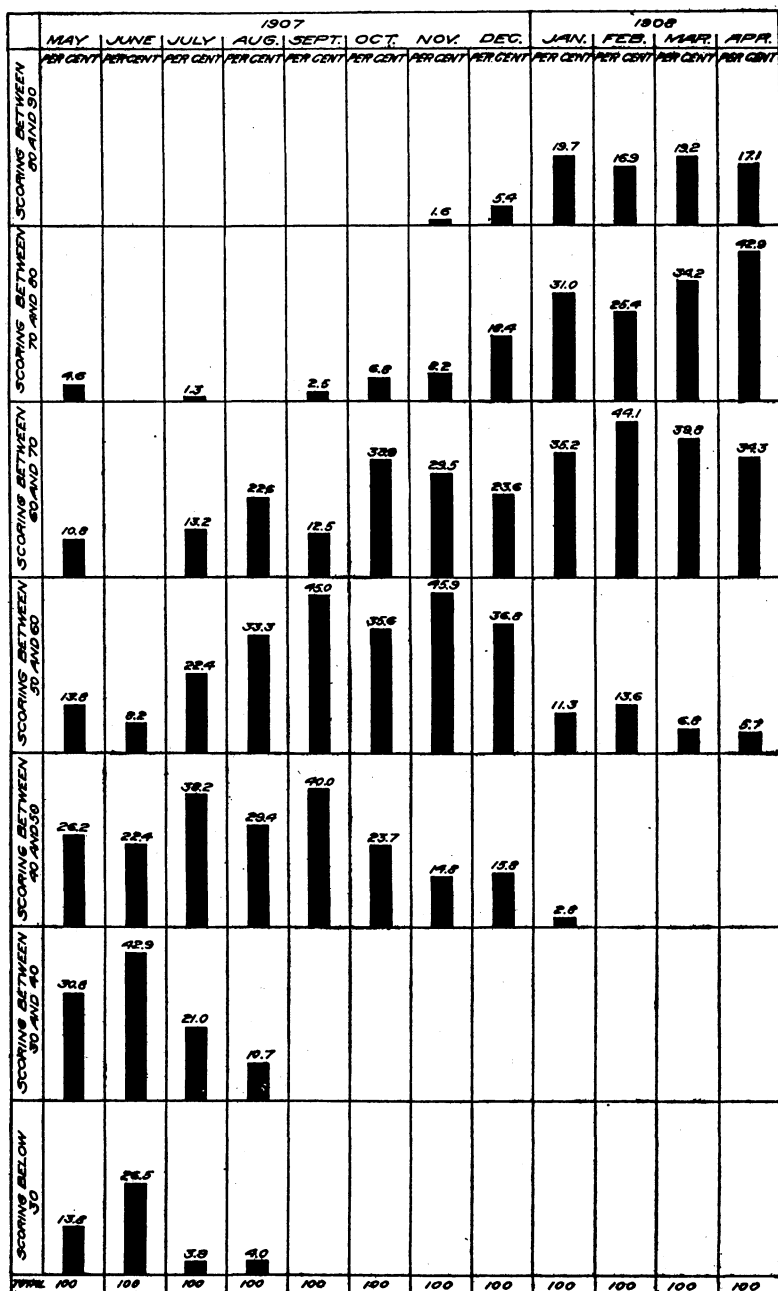


FIG. 2.—Diagram showing improvement in dairies supplying milk to Richmond, Va. Dairies are classed according to scores, the heavy lines indicating the proportion in each class from month to month.

the average score for all dairies was 41.5 at the start and that at the end of the twelve months it had increased to 72, a gain of 30.5 points, or 71 per cent. The higher score in May than in June is due to the fact that only a part of the dairies were scored in May and those were of the better class.

Figure 2 shows the condition of the dairies supplying Richmond, classed according to their scores. The shaded columns represent the percentages of dairies found in each class in each month, the exact percentages being shown by the figures. It will be observed that the number of dairies in the classes having the lower scores gradually decreased and disappeared from month to month, while the number of dairies in the higher classes increased correspondingly. For example, dairies scoring below 40 disappeared at the end of the fourth month, while those scoring between 80 and 90 first appeared in the seventh month and reached one-sixth of the total in the twelfth month.

The Richmond health officer says:

Common justice demands that very full credit should be given to the milk producers and to the city dairymen for their share in what has been accomplished. To anyone who was familiar with the conditions under which milk was produced and sold in the city of Richmond a year ago, a visit to the dairy farms supplying us with milk at the present time would prove little short of astounding. On every hand new stables have been erected and old ones improved, milk houses have gone up, stable yards have been improved, and, most important of all, better methods of milking, handling, and transporting the milk have been introduced. Both of our large city dairies have, of their own initiative, introduced bottled milk, and, in short, methods have been completely revolutionized.

Marked improvement has also been made in the milk supply of Montclair, N. J., by the use of the score-card system of inspection, as shown by the following statement comparing conditions in 1906 with those in 1907:

[Extract from the Thirteenth Report, Board of Health, Montclair, N. J., showing improvement in dairy conditions.]

Scores.	1906.		1907.	
	Number of dairies.	Percentage of total.	Number of dairies.	Percentage of total.
90-100.....	2	4.35	4	8.0
80-90.....	2	4.35	16	32.0
70-80.....	31	67.40	25	50.0
60-70.....	3	6.50	5	10.0
50-60.....	2	4.35	0	0.0
Below 50.....	6	13.05	0	0.0
Total 70-100.....	35	76.09	45	90.0

The tabulation shows that the number of dairies scoring between 70 and 100 in 1906 was 35, or 76.09 per cent, while in 1907 the number had increased to 45, or 90 per cent of the whole. Of the 6 dairies

that scored below 50 points in 1906, 5 have ceased to supply Montclair and the remaining 1 has so improved that it now scores 62 points. It should be noted that by this system of scoring the tuberculin test counts for 8 points and in the best dairies the application of this test has accounted for the gain in the score.

ADVANTAGES TO THE INSPECTOR.

Shows the inspector what to look for.—The score-card system is of particular value to the inspector in pointing out conditions, thus making it impossible to overlook any point of importance. All these items are kept in a permanent record by this system and comparisons can readily be made.

Incites competition.—Where the score-card system is in use there is frequently more or less competition for high scores. No dairyman wants the name of being the poorest. This competition makes it easier for the inspector to improve conditions, as his suggestions are readily heeded.

Cooperation between inspector and producer.—The system is generally well received by the dairymen, for the reason that it is clear, thorough, and absolutely fair. There is nothing mysterious about it. The inspector makes his explanations and becomes an instructor and a friend rather than an officer whose visits are to be dreaded.

Value of the system to inexperienced inspectors.—Whatever be the system of dairy inspection the inspector can not know too much about his business. Too much can not be said about the importance of competent inspectors. But with the score-card system the value of the intelligent inspector, interested in his work, is emphasized. Not only can he make a more satisfactory examination of the various details on the card and assign more accurate values to each, but in explaining his work to the dairyman he can be of great service as a teacher and helper. On the other hand, the score card is the salvation of the inexperienced, inefficient appointee, who, without some kind of a chart, would be hopelessly at sea and his work a failure. It is the evidence of competent observers in some cities that the milk supply has been improved even with poor inspectors, because they could not help securing some good results with a proper detailed score card in hand.

The score card was introduced in one large city and on examining the results of the first week's work, there being a variation of 25 points between the highest and lowest scores, the chief health officer remarked that never under the old system had the inspectors found anything to criticise or any suggestions to make in regard to the dairies scored that week; but when the results of inspection were expressed numerically, inspectors inexperienced in the use of

the score card could see and report 25-point differences. If the inspector does not attend to his business and has no interest in his work, the dairymen as well as the health officer will soon find it out. In the one or two instances where the system has failed it has been due to the inspector not desiring to compare results with his previous work.

ADVANTAGES TO THE DAIRYMAN.

Educationally.—It points out details in the production and handling of milk; makes clear what the defects are and what the ideal conditions should be. It also leads the dairyman to ask questions and to take more interest in his business.

It gives little opportunity for favoritism.—Inasmuch as each condition in the dairy has a definite number of points assigned to it the inspector is forced to be impartial, since his score once made is a permanent record of the office, and any unfairness can be at once detected if complained of by the dairyman.

It encourages confidence.—All dairymen feel that they are being treated alike.

It leads to greater profits.—More attention is given to details, which is an important economic factor in any business.

ADVANTAGES TO THE MILK DEALER.

The score-card system is of value to the dealer in assisting him to locate the better dairies, thus making it easier to secure a supply of milk to meet the demand made upon him for a good product. With a supply of good milk to handle there is less trouble with sour milk and less complaint from consumers. Many large dealers employ an inspector to give dairies supplying them with milk a rating on the basis of the score card, requiring them to reach a certain standard or stop shipping milk. To illustrate, one large milk company added the following note to the list of prices published January 1, 1908:

These prices apply only to those dairymen whose premises are scored 60 per cent or higher by the department of health. Those whose premises score less will have a reduced price paid, and milk from dairies scoring less than 50 per cent is not desired and will not be accepted.

On the other hand, some dealers are offering premiums for good dairies and good milk. One dealer in Washington, D. C., offered a bonus of 3½ cents a gallon for milk from dairies scoring 70 or above and where the cows were tuberculin tested. This same dealer offered a present of \$25 to each one of his shippers who improved his methods in such manner as to entitle him to a score of 80 points or better, in addition to giving him 3 cents a pound more for his butterfat; those scoring 70 or over were to receive \$20, and those

with 60 or over \$15, with the same advanced price for butterfat. One dealer succeeded in raising the standard of the 25 or more dairies supplying him with milk from an average of 56 points to 70 points, a gain of 14 points, or 25 per cent.

The score-card system has also been used with success in the improvement of the product sent to the creameries.

THE INSPECTION OF CITY MILK PLANTS.

City milk inspection a few years ago was merely a matter of detecting added water or preservative. With recent progress in sanitary science the work has broadened and boards of health are investigating the sanitary phases of milk production, transportation, and distribution.

In the smaller cities most of the milk consumed is retailed by the producers, and even in places of considerable size many producers are also retailers. In all cases where the functions of producer and retailer are merged in one person an inspection of the dairy farm discloses the methods of distribution as well as of production. The dairy-farm score card answers all purposes under such conditions.

As cities grow, however, the producers can not personally deliver milk to all the consumers; consequently middlemen become a necessity. These middlemen have places of business which are designated by different names in different places, but in these pages they will be referred to as "city milk plants."

These city milk plants have a wide range of capacity, equipment, and methods. At one extreme is a building 300 to 400 feet long on a spur of a railroad, where milk is received by the train load, cooled, mixed, filtered, perhaps pasteurized, canned or bottled, and held in cold storage until retailed in the city. The building has ample modern machinery for all these processes and for washing and sterilizing cans and bottles. At the other extreme is the dealer retailing only a few gallons. He may have no "plant," and his equipment may consist of only a carrier can and quart measure, which are washed in the kitchen sink with the family dishes. Or he may have fitted up the dark, illy ventilated basement of his residence as a "milk plant," with a wooden, musty tank for cooling milk, a few dozen bottles and a washtub in which to cleanse them, a dipper for filling bottles, and a brush to agitate lukewarm water inside the bottles. It does not necessarily follow that all small dealers adopt improper practices; but the chances are that the ordinary man with small capital and with only a little at stake will not take as much care as a person differently situated.

All of the varying styles of city milk plants need careful inspection, but the principles are the same as in dairy inspection: Milk should be exposed to the air as little as possible, and the air should be pure.

It should not be handled in unclean utensils, and it should always be kept cool. Based on these principles a score card for city milk plants has been devised by the Dairy Division and is used in a number of different cities. It has been found in practice to be adapted to both large and small plants. A copy of the score card follows:

[United States Department of Agriculture, Bureau of Animal Industry, Dairy Division.]

SANITARY INSPECTION OF CITY MILK PLANTS.

Owner or manager: _____. Trade name: _____.

City: _____. Street and No.: _____. State: _____.

Number of wagons: _____. Gallons sold daily: $\left\{ \begin{array}{l} \text{Milk:} \text{_____} \\ \text{Cream:} \text{_____} \\ \text{Buttermilk:} \text{_____} \end{array} \right.$

Permit or license No.: _____. Date of inspection: _____, 190 _____.

EQUIPMENT.	SCORE.		METHODS.	SCORE.	
	Per- fect.	Allowed.		Per- fect.	Allowed.
Plant:			Plant:		
Location.....	18		Cleanliness.....	15	
Convenience.....	6		Floor.....	6	
Surroundings.....	12		Cealls.....	4	
Arrangement.....	7		Willings.....	1	
Proper rooms.....	3		Doors.....	1	
Convenience.....	4		Windows.....	1	
Construction.....	9		Good order.....	1	
Floor.....	5		Free from odors.....	1	
Walls.....	3		Machinery and utensils:		
Ceiling.....	1		Cleanliness.....	25	
Light.....	1		Milk:		
Ventilation.....	1		Handling.....	25	
Screens.....	1		(Clarifying, pasteurizing,		
Machinery and utensils.....	20		cooling, bottling.)		
Kind and quality.....	7		Storage.....	20	
(Steam or hot water, bot-			45° F. or below.....	20	
tle and can washer, bottling			45° to 50° F.....	15	
machine, drying racks,			50° to 55° F.....	10	
crates, sinks, pasteurizer,					
cold storage.)					
Condition.....	7				
Arrangement.....	6				
Water for cleaning.....	28				
Wagons:			Wagons	6	
Construction, condition.....	4		Cleanliness.....	3	
Salesroom	11		Protection of product.....	3	
Location.....	4		Salesroom:		
Construction.....	4		Cleanliness.....	9	
Equipment.....	3				
	100			100	
ADDITIONAL DEDUCTIONS.			ADDITIONAL DEDUCTIONS.		
For exceptionally bad condi-			For exceptionally bad condi-		
tions:			tions:		
.....				
.....				
.....				
Total deductions			Total deductions		
Net total			Net total		

Score for methods.....; multiplied by 2.....

Score for equipment.....; multiplied by 1.....

Total, to be divided by 3.....

Final score.....

What has been said elsewhere of the advantages of the score card in dairy-farm inspection will apply here with equal force. The merits of the system are the same on the farm as in the city milk plant, but the latter usually scores higher than the former. The average score of the District of Columbia milk plants in 1907 was 72, on the basis of 100 points for perfect. This is considerably above the average for the dairy farms supplying milk to Washington, which was 45. The difference is partially explained by the fact that the number of city milk plants is about 80, while the number of dairy farms is about 1,000. It is further explained by the fact that the city milk plant must conform to the building and plumbing regulations. Such plants are more easily reached by the inspector than the remote dairy farms. They have the regular city water supply, which is presumed to be satisfactory for cleansing utensils. They are also required to be reasonably clean; otherwise they will create a nuisance by reason of bad odors.

Similar conditions have been found to exist in other places; that is, the score of city plants is generally higher than the average for the dairies. The District of Columbia perhaps presents a condition different from that in most other places in that it has many small city plants with relatively poor equipment, with a marked deficiency of light and ventilation, with lack of facilities for washing bottles, and with a close association of family and business quarters. On the other hand, in many other cities the producers retail their own product until the growth of the place leads some person or corporation with a fair amount of capital to erect a building planned especially for the business, having modern and effective machinery, maintained in a sanitary condition, having provision for ample refrigeration, and with plenty of steam for cleansing and sterilizing utensils and bottles. Therefore many cities have only a few establishments of the grade of city milk plants which may be contrasted on the score-card basis with the dairy farms.

The average of all the plants (about 80) in the District of Columbia was 72.58; 4 per cent scored 90 or above; 16 per cent scored in the 80s; 49 per cent scored in the 70s; 25 per cent scored in the 60s; and 6 per cent scored in the 50s. On the other hand, the "average" of plants in Richmond, Va. (only one), was 87; Memphis, Tenn. (two), 74; St. Louis, Mo. (five), 73; and Hannibal, Mo. (three), 65.

DIRECTIONS FOR SCORING.

Most of the items on the score card are self-explanatory; a few, however, call for special mention. The surroundings of the plant are important. Note should be made of the more apparent objectionable features, such as the proximity of horse stables or too close connection with sleeping rooms or rooms used for domestic purposes. It should also be remembered that even a detached building in a residential

district, especially a tenement district, may have its dangers. For instance, windows may be located so as to catch the dust from rugs as they are being shaken from the windows of an adjoining tenement.

In the smaller plants all of the processes will be carried on in one room, but different rooms for handling milk and washing bottles are desirable. When a plant has several rooms the scoring will be more difficult, but the inspector must use judgment in approximating a reasonable average where there is any defective construction or insanitary condition.

The kind and quality of machinery and utensils has reference both to their efficiency and sufficiency. Under this heading the larger plants will naturally receive a better score, because of complete equipment. The arrangement of the machinery refers to its adaptability with a view to sanitary work. Convenience promotes efficient or thorough work. In considering the handling of milk, note whether it is allowed to remain in uncovered tanks, vats, bottling machines, cans, or bottles any longer than is absolutely necessary before placing in storage. Notice whether coolers, receiving tanks, and the like are protected by cheese-cloth or other covers when not located in specially constructed sanitary rooms. Note whether milk is passed through piping that can not be taken apart and properly cleaned.

The health of employees is an important consideration and should receive the careful attention of inspectors. This is not given space on the score card for the reason that where unhealthy persons are handling milk that dairy should be refused a score and compelled by the health officials to discontinue business until the cases of disease are isolated and properly quarantined if contagious.

INSPECTION OF THE PRODUCT.

The inspection of market milk in the city includes: (1) collecting samples; (2) taking temperatures; (3) examinations for dirt; (4) tests for number and kind of bacteria, pus cells, etc.; (5) tests for fat and solids; (6) tests for adulterations and preservatives.

Collecting samples.—Samples of milk should be taken at regular intervals for analysis. These should be collected largely from retail delivery wagons, so that they will represent the product received by consumers. Where the milk is bottled, sampling is a simple matter, as one bottle will suffice for a sample. Where milk is dipped from cans or drawn from faucets, sampling is not so easy. However, if the inspector puts himself in the position of a consumer, taking the product sold to him for a sample, this will represent what the dealer is actually selling. In the inspection of hotels and restaurants the best plan is to order milk at the table the same as an everyday patron, then take for analysis what is actually served. This method some-

times requires a temporary assistant who is not known to the hotel or restaurant manager. Persons collecting samples should be familiar with the manner of taking evidence in court and should be able to prove the identity of the sample delivered to the analyst. It should not pass out of sight of the inspector until personally delivered to the man in the laboratory who is to examine it, unless it is under seal and properly marked for identification. When the inspector takes several samples on a single trip, each sample should be marked as soon as taken, so that no question can be successfully raised as to the possible mixing up of the samples.

Temperature.—Many cities are now requiring that the temperature of all milk brought to or delivered within their limits must be below 50° F. An accurate thermometer is all that is necessary for the inspector to determine whether the milk comes up to this requirement.

Examinations for dirt.—This is now an important part of the work of milk inspection, and dairymen are frequently fined as heavily for dirty milk as for milk that is below the standard in fat or solids. The dirt in milk can be detected by examining the bottom of the bottle after the sample has stood for an hour. It is also determined quantitatively by means of the centrifuge, which is now a part of the equipment of the modern city laboratory.

Tests for number and kind of bacteria, pus cells, etc.—The principal value of the bacteria count in milk is as an indicator. If the number of bacteria is high this indicates that the milk has not been produced and handled under sanitary conditions; that it has not been properly cooled at the farm and in transit, or that it is too old. The bacteria count, then, is valuable in the work of milk inspection, and gives the health officer some tangible clue to the dairyman who is careless and negligent. The bacteria standards of cities vary from 100,000 to 500,000 per cubic centimeter. A few cities place a limit for the number of pus cells and carefully examine the cows in dairies where the number is large, requiring the dairyman to discontinue the milk from unhealthy animals. No attempt will be made in this publication to describe the proper procedure in examining milk for bacteria, as standard methods have frequently been published. (See Farmers' Bulletin 348, "Bacteria in Milk.")

Tests for fat and solids.—The Babcock test is the simplest method for determining the fat in milk, and the lactometer in connection with the Babcock test will give a fairly accurate idea of the total solids. Other methods that are more accurate and which require much more time may be followed where the laboratory facilities permit.

Tests for adulterations and preservatives.—The necessity for these tests is becoming less from year to year. In many cities adulterations are seldom found. Simple methods have been worked out for their detection which can be readily followed even by an inexperienced

analyst. Attention is called particularly to Bulletin 100, Bureau of Chemistry, United States Department of Agriculture, entitled "Some Forms of Food Adulteration and Simple Methods for Their Detection."

REQUIREMENTS OF A PROPER INSPECTION SYSTEM.

Present conditions indicate that a more rigid inspection is necessary and that more competent inspectors should be employed. They should be well trained along the lines of dairy sanitation and the production and distribution of milk, and capable of instructing the dairyman in all details of his work. Further, when instruction fails to bring about the desired results, there should be enough backbone in the system to enforce the regulations prescribed by the board of health and to keep all dairies up to the standard.

INSPECTION IN LARGE CITIES.

In order to do the most effective work under the score-card system some inspectors should devote their entire time to looking after conditions on the dairy farms. With farms widely scattered one inspector should be provided for, approximately, every 100. One-half of the force should be skilled veterinarians and the other half should have had good dairy training or its equivalent. The corps of inspectors should be responsible to a chief inspector whose duty it is to supervise the whole work. The chief inspector should be responsible to the health officer or commissioner. Full power should be vested in the board of health to make proper rules and regulations and to enforce the same, thus protecting the health of the public.

INSPECTION IN SMALL CITIES.

In smaller cities there will not be enough work to warrant so large a force or so much outlay as outlined above. Frequently it will be necessary for one man to inspect dairies, make the sanitary inspections in the city, take samples for evidence of adulteration, and possibly do his own chemical and bacteriological work. But even under these circumstances an inspector who is interested in his work could be trusted to inspect the farms with the score card, for he would be more or less familiar with the milk problem as a whole. Even in the smaller cities milk work should be a distinct department of the board of health and not combined with slaughter-house inspection, tenement inspection, etc.

CHANGES IN HEALTH BOARDS DETRIMENTAL.

It is unfortunate that health officers and dairy inspectors are constantly changing, as this cripples or destroys systematic work and retards improvement. Officers of health departments should be appointed under civil-service regulations.

A PLAN FOR SYSTEMATIZING DAIRY INSPECTION.^a

The following-described plan for systematizing and simplifying the work of dairy inspection is inserted for the purpose of helping cities to provide better inspection service. It is a well-known fact that many inspectors employed by cities are not well qualified for their duties, while others who may be competent lack the interest necessary to render efficient service. The methods described are calculated to assist such inspectors by illustrating the work to be performed and providing a routine course to follow.

The plan was adopted in the fall of 1907, and was devised not only for the benefit of the inspection service but for the purpose of arousing public interest in the matter with a view to bettering the quality of the milk supply.

The essential feature of the plan consists in the use of county maps, upon which are fastened studs or thumb tacks, each one representing a dairy and thus showing the exact location of all the dairies supplying milk to the city. The tacks should be of two colors, in order to distinguish between the herds that are tuberculin tested and those that are not tested, and each tack has a number on its head representing the dairyman's permit number. For convenience in the illustration, one color of tack is represented by a circle and the other by a square. The permit numbers of dairymen who have gone out of business are transferred to new dairymen as they come in. By this process the same tacks are always kept in use.

The maps used for this purpose are the standard county drawings, which can be secured for a small sum from the engineer's departments at the various county court-houses. These maps give the location of every farm in the county, with the number of acres and the owner's name; they indicate, also, every road that leads to these farms. They show in addition all the cities, towns, railroads, traction lines, rivers, and creeks; there is also a scale for measuring the distance from one place to another. In order to make a complete system it is necessary to have the maps of all the counties from which milk is shipped to the city.

The maps are placed on panels made of soft wood so that tacks may penetrate easily. These panels are hung on hinges so that they may be swung into a casing and closed to prevent dust and dirt from accumulating on the maps.

Each map should be marked with horizontal and perpendicular lines which cross and form squares on the face of the map, or these lines may be imaginary and indicated by the figures at the margin.

^a This is an original plan worked out by Dr. Lee H. P. Maynard, of the Dairy Division, while inspector for the board of health of Columbus, Ohio. It has proved valuable to both health officer and inspector.

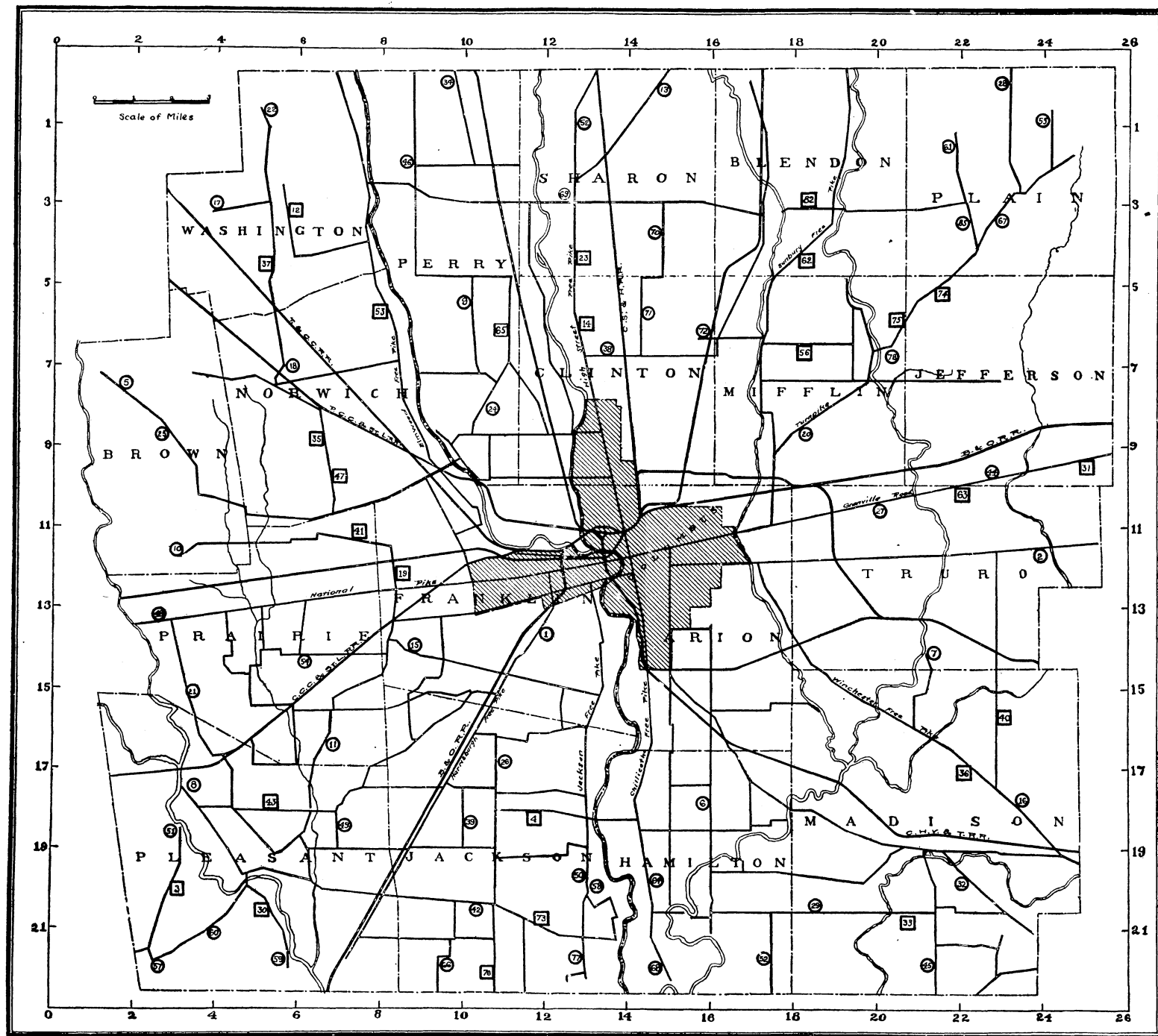


FIG. 3.—Map of Franklin County, Ohio, illustrating plan for systematizing dairy inspection. Figures in squares represent dairies having tuberculin-tested herds; other dairies are indicated by figures in circles.

Each one of these lines should be numbered, the horizontal ones with odd and the perpendicular ones with even numbers, or vice versa; hence the square above line No. 1 and to the left of line No. 2 is indicated in the index by 1-2. The square above No. 1 horizontal and just to the left of No. 4 perpendicular is indicated by 1-4 in the index. By this method the location of all dairies in the county can be learned in a very short time.

The highways, railroads, and traction lines which serve as means of transportation are plainly marked on these maps, therefore it takes but a short time to determine the shortest and quickest route of inspection. The scale of the map aids in measuring the distance.

The index to the map consists of a book made similar to a loose-leaf ledger, so that old leaves can be removed and new ones inserted. The form of the index is indicated below, each sheet being ruled to contain the record of twelve months. The names are arranged in alphabetical order, space being left after each letter for the insertion of new names.

Index showing location and score of dairies and date of inspection.

Per- mit No.	Location on map.	Name.	January.		February.	
			Date.	Score.	Date.	Score.
5	3-24	Adams, J. H.....	4	62	3	68
56	17- 4	Atkinson, Charles.....	2	90	5	92
18	7-18	Barnes, L. M.....	10	71	12	74
32	5-12	Brooks, W. H.....	16	86	20	87
9	15- 6	Burrows, Daniel.....	3	79	8	81

NOTE.—The information given in the above table does not refer to the map shown in figure 3, but is intended merely to illustrate the method of keeping the index.

This index book fits in the case with the map, so that at any time it can be used to locate dairy farms.

A desirable place for the case containing the maps would be the lobby at the health office, so that when people have occasion to visit the office they would notice this public information and tell others of it. It would then become generally known that information concerning a dairy could be obtained at any time by inquiring at the health office. Again, the dairymen themselves, while renewing their permits, seeing such information and noting their standing and that it is made public, would naturally aim to raise their standard.

Milk consumers often call or telephone to the health office for information concerning the dairy which supplies them with milk, and if the dairy inspector should happen to be out the clerk would be at a loss to answer unless he could refer to a map. In large cities having a number of inspectors the chief or any one of the inspectors can not be expected to know the exact location of all the dairies, but

such information should be available. The plan described overcomes these difficulties and even enables the consumer himself to compare the condition of the dairy supplying him with milk with other dairies that supply milk to his immediate neighborhood. He could also trace for himself the route to the dairy and visit it.

SOME ADVANTAGES OF THE PLAN.

In the absence of some such system as the one described the monthly reports of inspectors to the board of health could be padded, and it would be very difficult for the board or the health officer to detect the incorrectness in inspectors' reports; but if the date, route, and scores were posted monthly in a public place dairymen would gather to ascertain how their scores compared with those of neighboring dairies, hence false reports would soon be noticed and an explanation demanded.

New inspectors, not being acquainted with the location of the dairymen, usually experience difficulty the first year in finding the dairies; in fact, the new inspector who has to locate 400 or 500 dairies scattered over three or four counties can consider the first year of his service partially wasted unless the dairies have been located by the previous inspector and a record in the form of a map left as a guide. In this way he could begin intelligently just where the former inspector's work ended.

Inspectors should aim to raise their work to a high standard, and by keeping this work before the public it will soon appreciate the value of such service. The proper scoring of dairies is a service that can not be performed by laymen, and improper scoring, if made public, will get the inspector into trouble. The map system, if adopted, would reveal the ability of an inspector as well as his daily work to the people. It will also set a standard by which successors must be guided, and if incapable their inability to render efficient service is at once manifest.

If the plan above outlined were universally adopted and maps were made of all counties in a State and a copy of each filed with the State dairy official, a complete State record could be made available, containing the number and names of the dairymen, the location and score of each dairy, also the location of all tuberculin tested herds in the State. This would assist the State dairy official in determining the counties in which his services were most needed. Similarly, complete State statistics would aid the national authorities in ascertaining the conditions existing in each State, and thereby enable them to make better laws for the protection of dairy products in interstate commerce. Such information would be of immense value also in dealing with the tuberculosis question.

THE SCORE-CARD METHOD OF RATING THE QUALITY OF MILK

The score-card system of rating milk was first used by the Dairy Division at the National Dairy Show, in February, 1906, where a milk exhibition was held under its direction. Since this national contest several States have been induced to hold similar exhibitions in connection with their dairy association meetings, including New Hampshire, Massachusetts, Pennsylvania, Ohio, Illinois, Connecticut, and Missouri. The city of Cleveland has also held two contests in cooperation with the Dairy Division and several other cities have made application for assistance in conducting like contests. The following is a copy of the score card recommended by the Dairy Division at the present time. While the system may not be practical for use of city boards of health, it has proved of great value from an educational standpoint in connection with the contests described above. (See Circular 117, Bureau of Animal Industry, United States Department of Agriculture.)

[United States Department of Agriculture, Bureau of Animal Industry, Dairy Division.]

SCORE CARD FOR MARKET MILK.

Exhibitor: _____.

Address: _____, _____.

NUMERICAL SCORE.

Flavor, 40.	Composition, 25.	Bacteria, 20.	Acidity, 5.	Appearance of package and contents, 10.	Perfect score, 100.
					Judge's score.

DESCRIPTIVE SCORE.

Flavor.	Composition.	Bacteria.	Acidity.	Package and contents.
Excellent.	Perfect.	Perfect.	Perfect.	Perfect.
Good.	Fat, — per cent.	Total, —.	— per cent.	Foreign matter.
Fair.	Solids not fat, — per cent.	Liquefiers, —.		Metal parts.
Bad.				Unattractive.
Flat.				
Bitter.				
Weedy.				
Garlic.				
Silage.				
Manure.				
Smothered.				
Other taints.				
.....				
.....				

Remarks: _____.

Date: _____.

_____, Judge.

DIRECTIONS FOR SCORING.

FLAVOR.

If rich, sweet, clean, and pleasant flavor and odor, score perfect (40). Deduct for objectionable flavors and odors according to conditions found.

COMPOSITION.

If 3.25 per cent fat or above and 8.5 per cent solids not fat or above, score perfect (25). Deduct 1 point for each one-fourth per cent fat below 3.25 and 1 point for each one-fourth per cent solids not fat below 8.5.

BACTERIA.

Less than 10,000 per cubic centimeter.....	(perfect) 20
Over 10,000 and less than 25,000 per cubic centimeter.....	19
Over 25,000 and less than 50,000 per cubic centimeter.....	18
Over 50,000 and less than 75,000 per cubic centimeter.....	17
Over 75,000 and less than 100,000 per cubic centimeter.....	16
Deduct 1 point for each 25,000 above 100,000.	

When an unusually large number of liquefying bacteria are present, further deduction should be made according to conditions found.

ACIDITY.

If 0.2 per cent or below, score perfect (5). Deduct 1 point for each 0.01 per cent above 0.2 per cent. (If Mann's test is used, discontinue adding indicator on first appearance of a pink color.)

APPEARANCE OF PACKAGE AND CONTENTS.

If package is clean, free from metal parts, and no foreign matter can be detected in the contents, score perfect (10). Make deductions according to conditions found.

ADAPTABILITY OF THE SYSTEM TO VARIOUS SECTIONS OF THE COUNTRY.

In traveling across the country we find the dairy conditions somewhat varied, particularly in respect to climate. For example, in the New England and Central States the temperature frequently drops several degrees below zero during the winter months. This necessitates tight barns and an automatic system of ventilation, together with a reasonable amount of air space, if the animals are to be kept comfortable and healthy. On the other hand, there are sections in the South and on the Pacific coast where the stables are simply open sheds which afford all the protection necessary. Here sunlight, ventilation, and air space are unlimited and these points hardly need to be included in a score card. In such instances the boards of health have readily modified the Department score card to meet these different conditions.

THE SCORE-CARD SYSTEM AND THE CONSUMER.

Unless public sentiment demands a good quality of milk and consumers are ready to meet the increased cost, improvement must necessarily be slow. The quality of milk, then, in a large measure, rests with the consumer. The publication of the scores of the various dairies supplying a city with milk (see p. 13) gives the consumer an opportunity to know the exact conditions on the various dairy farms, and he should encourage the production of good milk by

patronizing the dairymen who have good ratings and who are trying to produce clean milk. This plan will also have a tendency to discipline the careless and slovenly dairyman and force him to improve or go out of business. It is most unjust to the producer of clean milk to be compelled to sell his product on equal terms with the producer of dirty milk. Dirty milk should not be allowed to be sold at all, but where all grades of milk are sold the price should be graded according to the quality of the goods, the same as other food products. A good way to secure wholesome milk is to refuse to patronize a dirty dairy.

LIST OF PUBLICATIONS ON TESTING OF MILK AND CREAM.

BOOKS.

- FARRINGTON, E. H., and WOLL, F. W. *Testing Milk and Its Products*. Madison, Wis.
- HARRINGTON, CHARLES. *A Manual of Practical Hygiene for Students, Physicians, and Medical Officers*. Philadelphia and New York. 1905.
- LEACH, A. L. *Food Inspection and Analysis for Use of Public Analysts, Health Officers, Sanitary Chemists, and Food Economists*. New York. 1904.
- MELICK, C. W. *Dairy Laboratory Guide* (p. 20). New York. 1907.
- RICHMOND, H. D. *Dairy Chemistry* (p. 164). London. 1899.
- SCHOENMAN, A. *Milk Testing*. Published by the author, Madison, Wis. 1895.
- SNYDER, H. *Chemistry of Dairying* (ch. 2). Easton, Pa. 1897.
- SNYDER, H. *Dairy Chemistry* (ch. 2). New York. 1906.
- VAN SLYKE, L. L. *Modern Methods of Testing Milk and Its Products*. New York. 1907.
- WING, H. H. *Milk and Its Products* (ch. 3). New York. 1897.

AGRICULTURAL EXPERIMENT STATION BULLETINS.

- Connecticut Bulletin 106. *Babcock Method of Determining Fat in Milk and Cream for the Use of Creameries*.
- Connecticut Bulletin 108. *Determination of Fat in Cream by the Babcock Method*.
- Connecticut Bulletin 117. *The Babcock Method of Determining the Proportion of Fat in Milk and Milk Products*.
- Illinois Bulletin 9. *Milk and Butter Tests; Milk Tests*.
- Illinois Bulletin 10. *Investigations of Milk Tests*.
- Illinois Bulletin 14. *Milk Tests; Methods of Testing Milk*.
- Iowa Bulletin 8. *The Iowa Station Milk Test*.
- Iowa Bulletin 67. *Solutions for Testing Cream and Milk*.
- Maine Bulletin 4 (new series). *Testing Cream and Milk; Fat Test and Lactometer*.
- Mississippi Bulletin 15. *Comparative Tests of Machines and Methods for the Determination of Fat in Milk*.
- Mississippi Bulletin 21. *A New Method for Testing Milk*.
- New Hampshire Bulletin 114. *The Babcock Test for New Hampshire Farmers*.
- New York (Cornell) Bulletin 17. *A Description of Cochran's Method for the Determination of Fat in Milk, for Use of Dairymen*.
- New York (Cornell) Bulletin 29. *Application of Dr. Babcock's Centrifugal Method to the Analysis of Milk, Skim Milk, Buttermilk, and Butter*.
- New York (Geneva) Bulletin 19 (new series). *A Method for the Determination of Fat in Milk and Cream*.
- North Carolina Bulletin 113. *The Testing of Milk*.

Oregon Bulletin 70. Testing Milk and Cream.

Pennsylvania Bulletin 12. Simple Methods of Determining Fat in Milk.

Pennsylvania Bulletin 33. Directions for Using the Babcock Milk Test.

Vermont Bulletin 16. Testing Milk at Creameries.

Vermont Bulletin 21. *a*, A New Milk Test; *b*, Testing Milk at Creameries and Cheese Factories.

West Virginia Bulletin 13. The Creamery Industry—Methods of Testing Milk. Pp. 41–63.

Wisconsin Bulletin 16. New Method for Determining Fat in Milk.

Wisconsin Bulletin 24. New Method for Estimation of Fat in Milk, especially adapted to Creameries and Cheese Factories.

Wisconsin Bulletin 31. Notes on the Use of the Babcock Test and the Lactometer.

Wisconsin Bulletin 36. Directions for Using Babcock Test and the Lactometer.

Wisconsin Bulletin 52. Comparison of the Babcock Test and Gravimetric Method of Estimating Fat in Skim Milk; and Its Relation to the Dairy Industry.

Wisconsin Bulletin 156. Simple Test for Casein in Milk.

Wisconsin Station Report, 1900. Influence of Temperature on Tests of Skim Milk by the Babcock Test. Pp. 81–86.

Wisconsin Station Report, 1903. Methods and Apparatus for Testing Milk and Milk Products. Pp. 118–182.

U. S. DEPARTMENT OF AGRICULTURE BULLETINS.

Bureau of Animal Industry Bulletin 58. The Fat Testing of Cream by the Babcock Method. Price 5 cents.^a

Bureau of Chemistry Bulletin 100. Some Forms of Food Adulteration and Simple Methods for Their Detection. Price 10 cents.^a

Bureau of Chemistry Bulletin 107. Official and Provincial Methods of Analysis, Association of Official Agricultural Chemists. Price 20 cents.^a

Approved:

JAMES WILSON,

Secretary of Agriculture.

WASHINGTON, D. C., *December 29, 1908.*

^a These publications may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C.

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